CHAPTER 7

Factors Influencing Flood-Related Coping Appraisal Among Homeowners and Residents in Kampala, Uganda

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7.1 Introduction

Households in many Global South cities endure the loss of lives, illness, and property damage due to floods. Floods are the most frequent and damage-inflicting disasters worldwide (Chai et al., 2020; de Koning et al., 2019). Of all disasters, they represent 69% in Africa, 46% in Europe, and 47% in Asia (CRED, 2021). Although in Africa the proportion of flood damage is still relatively low at 17% compared to 46% and 49% for Europe and Asia, respectively, their impact on both private homeowners' and residents' livelihoods, and local economies is high considering

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the generally high levels of vulnerability in the continent (Fraser, 2017). In many African cities, for example, 62–70% of the population live in informal settlements (Simiyu et al., 2019), which in many cases are low-lying and flood-prone. The combination of the flood hazards in these areas and the socio-economic status of the informal settlement dwellers is translating into increased flood risk. The frequency of floods is also increasing due to climate change.

The flood risk management burden on governments has therefore become increasingly heavy (Jha et al., 2012). For this reason, government policies in many countries have adopted an integrated approach to flood risk management, which acknowledges that both homeowners and residents can meaningfully contribute to the risk management process. Homeowners' and residents' mitigation efforts have therefore become integral in increasing resilience to floods and thereby augmenting government efforts (Everett & Lamond, 2014; Grothmann & Reusswig, 2006; Howe, 2011; Oakley et al., 2020). This is also true for Kampala, Uganda's capital city.

The City's administrative authority—Kampala Capital City Authority (KCCA) seeks ways in which homeowners and residents can contribute to resilience-building efforts after the implementation of the Integrated Flood Management in Kampala Project (IFMK—a project funded by the UN-Habitat) produced models of future urban growth and flooding for the city and recommended a series of measures to reduce flooding (UN-Habitat, 2013). Some measures included: regular engineering and community-based drainage cleaning; sensitization of communities for proper sewage management and flood management; increasing infiltration by planting vegetation and using permeable technologies; widening of drainage channels (UN-Habitat); and water harvesting (Nadraiqere, 2014). From the foregoing, one can observe that like many city-wide flood management projects, the IFMK could not explore in-depth, the current state and potential of property-level mitigation, except for those directly related to hydrological modeling. Besides the fact that much of what households can contribute to resilience-building was beyond this project, many of the recommendations required household and community participation in the resilience-building process. Such participation depends on the intrinsic perceptions and motivation of households and communities that we focus on in this study by assessing households' coping appraisals.

This chapter provides insights into the motivations of homeowners and residents, from three case study areas with varying risk levels, to implement specific measures, some of which have been popularized in recent years with regards to flood resilience buildings. For example, the chapter documents the perceptions of both homeowners and tenants regarding, among others, Sustainable Urban Drainage Systems (SuDs), that fall under nature-based solutions to flooding (Everett & Lamond, 2014; IUCN, 2016; Nadraiqere, 2014). According to the available climate change adaptation literature, implementing these approaches has taken a slow pace due to path dependence on other engineering approaches (Davies & Lafortezza, 2019), and Kampala is no exception. We also assess homeowners' and residents' potential responses to the government's implementation of engineering solutions in Kampala, which is important because as has been established elsewhere, it can cause excessive trust in government efforts may culminate in the reduction of private mitigation measures (Terpstra, 2011).

7.2 Theoretical Framework and Literature Review

7.2.1 Theoretical Framework

Adoption of flood mitigation measures by households has been associated with behavioral processes linked to their perceptions of risk vis-à-vis their perceived capacity to protect themselves (Everett & Lamond, 2014). The Protection Motivation Theory (PMT; Rogers, 1975), which is among the key theories explaining individual risk behavior in Chapter 3 of this volume, is arguably the most applied in autonomous and private risk mitigation research. PMT relates the implementation of disaster mitigation measures to the mental processes of at-risk individuals regarding the severity of risk, their ability to cope, the effectiveness of potential measures, and the costs of the measures. Figure 7.1 illustrates these conceptual links and demarcates the conceptual boundaries of this study. In the conceptualization, experiencing a disaster (in this case flooding severity), or learning about it, triggers a response process with a binary outcome variable (whether to protect oneself or not). The process is based on the cognitive assessment of the risk at hand (threat appraisal) (Ardaya et al., 2017; Babcicky & Seebauer, 2019; Bubeck et al., 2013), the perception of one's ability to protect oneself; and the perception

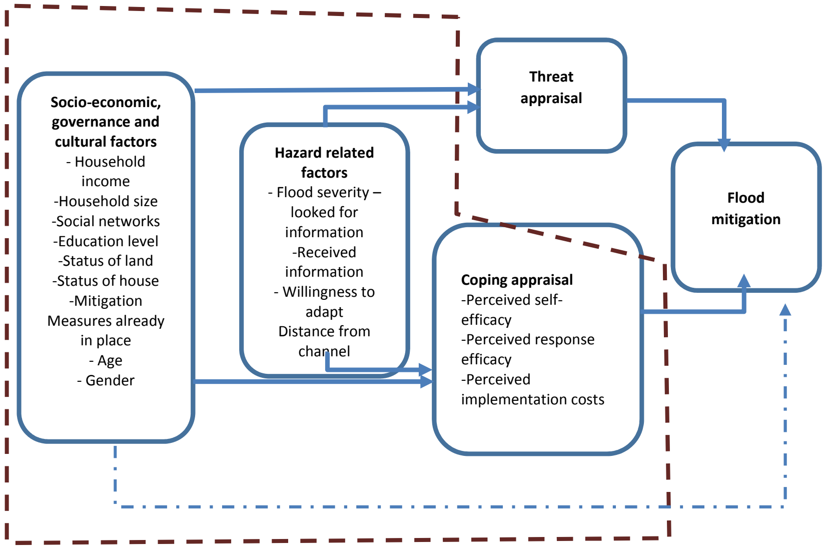

Fig. 7.1 Extend Protection Motivation Theory (Adapted from Bubeck et al. [2018]—the current work focuses on concepts within the brown polygon)

of the effectiveness and costs of mitigation measures at hand (coping appraisal). An extension of this formulation brings in additional socio-economic variables as shown in Fig. 7.1. In this formulation, household income, household size, social networks (within the collective efficacy thinking [Babcicky & Seebauer, 2020]), education level, and tenure status are believed to have an indirect impact on the flood damage mitigation level or choice of a flood damage mitigation measure as indicated by the blue dashed arrow and direct influence on threat and coping appraisal.

7.2.2 Past Studies on Homeowners and Residents' Coping Appraisals

Most PMT studies proffer insights that are largely related to Global North case studies. Moreover, they focus on compounded assessments and do not assess it per mitigation measure. Accordingly, studies which document factors affecting measure-specific flood coping appraisals by homeowners and residents are scarce. Much of the available literature documents factors that influence their mitigation behavior or intentions to mitigate against flooding or climate change impacts (Botzen et al., 2019; Brody et al., 2010; Grothmann & Reusswig, 2006; Koerth et al., 2013; Kreibich et al., 2011; Osberghaus, 2015; Poussin et al., 2014; Terpstra, 2011; Vávra et al., 2017). Given that measure-specific appraisals are the pathway to the eventual adoption of flood coping measures, it is important to discuss the factors that influence such decisions by homeowners and residents to lay some sort of foundation for this study. One key finding in these studies is that both homeowners and tenants think that it is the role of the government authorities to put up mitigation measures, thereby limiting their motivation to self-protect, for example, in Bichard (2012) and Terpstra (2011). Related to this, Osberghaus (2015) identified interaction effects and concluded that risk-seeking and lower-educated homeowners are likely to mitigate even if they expect government aid, while risk-averse and highly-educated households do not. More generally, the source established that homeowners were more likely to mitigate against flood risk than tenants. Relating to self-protection with insurance, Antwi-Boasiako (2016), found that homeowners are discouraged from putting up flood mitigation measures because insurers tend to interpret them as evidence of more flood risk and therefore demand higher premiums compared to properties without measures, yet in fact, private measures reduce the flood damage risk.

There is, however, a growing subset of risk perception and mitigation studies zooming into subcomponents of the PMT to reveal detailed insights and provide component-specific policy recommendations. Such studies have concentrated on establishing the determinants of threat and coping appraisal and they have revealed mixed results (Babcicky & Seebauer, 2017; Bubeck et al., 2018; Fox-Rogers et al., 2016; Schlef et al., 2018; Seebauer & Babcicky, 2020) to proffer detailed policy recommendations on appraisal elements of the PMT. In this work, we concentrate only on the factors influencing coping appraisal.

While Bubeck et al. (2018) acknowledged the need for assessing antecedents of coping appraisal of households per mitigation measure, their reporting touches on mitigation types, i.e. structural and non-structural grouping of measures not necessarily mitigation measure by mitigation measure. Only the purchase of insurance is studied as an individual measure. Information on coping appraisal and the implementation of individual measures is important in situations where local authorities would like to know which measures would likely enjoy the support of community members and how they could complement private mitigation investments.

Our objective was therefore, to identify influencing factors of coping appraisal in a sub-Saharan African city, thereby testing the applicability of PMT in a less developed context. We also establish measure-specific appraisals that can help to improve the PMT framework while at the same time providing insights to Kampala city and other developing world cities on how best to harness the potential of homeowners and residents to contribute to the flood resilience-building processes. These measure-specific appraisals are perceived self-efficacy SE); Response Efficacy (RE); and Implementation Costs (IC) for raising the floor or rebuilding the house; putting up a small dyke; Putting up a pile of sandbags; raising sockets; capturing rainwater; planting grass; clearing the drainage; and temporarily moving away to a safe place. We used the parts of PMT with applicable variables bordered by the brown dashed border polygon in Fig. 7.1, having modeled its other parts elsewhere. Below we list five research hypotheses that guided this study.

7.2.3 Research Hypotheses

We tested the following hypotheses which have guided similar studies elsewhere, for example, the first four have guided the work of Bubeck et al. (2018), and the 5th is our addition:

H1: Where the degree of social vulnerability (in terms of income, education level, social networks, household size, tenure status, gender, and age) is high, households' perceptions of self-efficacy are low and perceptions of implementation costs are high.
H2: Flood severity is positively correlated with response and self-efficacy, i.e. where levels of flood severity are high, also the self-perception of the household's response efficacy is high.
H3: Receiving flood-related information is positively correlated with perceptions of response and self-efficacy and negatively related to perceptions of implementation costs.
H4: Risk-averse households have lower perceptions of response and self-efficacy and higher perceptions of implementation costs.
H5: Level of mitigation already in place is positively correlated with perceptions of self-efficacy and response efficacy, but negatively correlated with perceptions of response costs, i.e. households

with high levels of mitigation already in place have perceptions of high self-efficacy and response efficacy, and perceptions of low implementation costs at the same time.

7.3 Research Design

7.3.1 Case Study Areas

Kampala's population was estimated at 1,750,000 people in 2019 (KCCA, 2019), 60% of which live in informal settlements (Richmond et al., 2018) that increasingly encroach into environmentally sensitive areas. This, coupled with its hilly terrain and tropical climate, results in increasing flash floods. While the government is making some efforts to reduce the impacts of flash floods, homeowners and residents also implement autonomous measures such as rebuilding the house, raising the floor of the house, and building small dykes, among others (Chereni, Sliuzas, Flacke, & van Maarseveen, 2020). We carried out a survey in August 2017, in two high-density settlements—Bwaise III (a slum that first developed in 1960) and Natete (part planned and part slum that developed in 1960), and one affluent neighborhood—Ntinda which was established in 1960. Figure 7.2 shows the study areas.

The settlements have populations of 22,000 (4000 households), 45,000 (9000 households), and 35,000, respectively (ACTogether, 2014; ACTogether Uganda, n.d.; KCCA, 2011). Bwaise and Natete have experienced much flooding over the past decades while Ntinda began to experience floods more recently. Bwaise III has benefited from the widening of the Nsooba-Lubigi primary drainage channel by KCCA while the other two cases have not yet benefited from such drainage investments.

7.3.2 Sampling and Data Collection

We used systematic random sampling and interviewed 154 households in Bwaise III, 248 in Natete, and 210 in Ntinda (Chereni, Sliuzas, Flacke, & 2020). We administered a semi-structured questionnaire, completed with the help of bi/multilingual research assistants who interpreted the questions for the respondents (Chereni, Sliuzas, & Flacke, 2020). The questionnaire generated data on flood Severity, flood information, threat

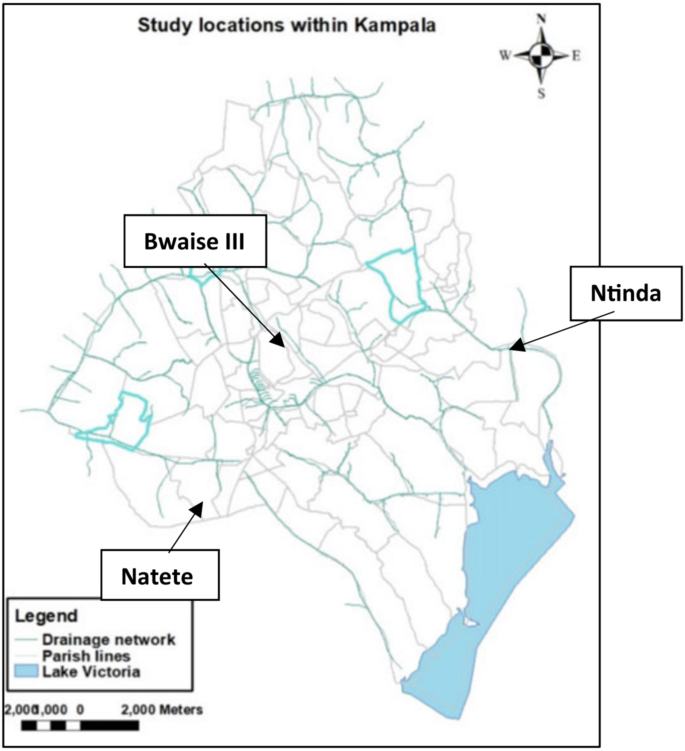

Fig. 7.2 Study locations in Kampala

appraisal, coping appraisal, and flood mitigation measures. Table 7.1 describes the variables observed and modeled in the current work:

7.3.3 Data Analysis

The data were analyzed using the Statistical Package for Social Science (SPSS). In the first step, we correlated all variables (using Spearman's Rho) to identify multicollinearity, at the same time identifying important variables influencing coping appraisal elements. Subsequently, important factors were included in sets of ordinal regression models estimating coping appraisals per measure to quantify the amount of variation in the coping appraisal elements they explain, and the proportional odds

Table 7.1 Explanation of variables

Main PMT concept	*Variable*	*Explanation*
Hazard-related factors	Willingness to mitigate	Ordinal variable ranked from 1 (not willing) to 4 (Highly willing) measured per year over the three years
	Distance from drainage channel	Ordinal variable ranked from 1 (1–50) to 7 (301 m+)
	Flood Experience (severity)	Ordinal variable ranked from 0 (no flooding) to 4 (Extremely high) Solicited per mitigation measure
	Duration of residency	Ordinal variable ranked from 1 (1 year) to 6 (20+ years)
Socio-economic, governance and cultural factors	Property tenure status	Ordinal variable ranked from 1 (Owner) to (Usufruct)
	Size of social network	Ordinal variable ranked from 1 (no household) to 4 (6+ households)
	Education level	Ordinal variable ranked from 1 (Communitarian) to 4 (Structural level 2)
	Income	Ordinal variable of salary brackets ranked from 1 (0–40,000 UGX) to 10 (360,001+)
	Household size	Ordinal variable ranked from 1 (one person) to 6 (Large family)
	Mitigation measures before 2017	Binary variable ranked from 1 (yes) and 2 (no) solicited per measure
	Age	Ordinal variable ranked from 1 (15–24 years) to 6 (65+ years)
Coping appraisal	Perceived self-efficacy (SE)	Ordinal variable ranked from 1 (Not able) to 4 (highly able)—Solicited per mitigation measure

(continued)

Table 7.1 (continued)

Main PMT concept	*Variable*	*Explanation*
	Perceived response efficacy (RE)	Ordinal variable ranked from 1 (none) to 4 (more) Solicited per mitigation measure
	Perceived Implementation costs (IC)	Ordinal variable ranked from 1 (none) to 4 (more) Solicited per mitigation measure
Threat appraisal and flood-related loss	Perceived likelihood of damage	Ordinal variable ranked from 1 (no) to 4 (high), Solicited per mitigation measure
	Flood-related financial loss	Binary variable with 1 (yes) and 2 (no) Solicited per mitigation measure
	Received information about flooding	Binary variable with 1 (yes) and 2 (no), Solicited per mitigation measure

of changes in the ranks of explanatory variables relative to the ranks in the dependent variables.

7.4 Results

7.4.1 *Association Between Explanatory Variables and Coping Appraisal Elements in the 5 Hypotheses*

In this section, we correlate the explanatory variables and measure-specific appraisal elements, (i.e. perceptions of self-efficacy; response efficacy; and implementation costs). The measures common in Kampala as presented in Sect. 7.2 above are: raising the floor or rebuilding the house, putting up a small dyke; piling up sandbags; raising electric sockets; capturing rain-water; planting grass; clearing the drains; and temporarily moving away to a safe place.

In Table 7.2, we provide a snippet of descriptive statistics of some explanatory variables to enable a quick understanding of the socio-economic statuses and a total number of households that we interviewed. The results show small ratios of homeowners to tenants in all three areas and more male respondents. The mode income bracket for Natete is the lowest on the income brackets scale while in Ntinda it is the highest income bracket. In Bwaise III, it is the third-lowest bracket. Regarding the highest education attained by a household member, 'high school level' is the mode for Bwaise III and Natete while for Ntinda it is 'tertiary level.' Flooding is more severe in Natete, followed by Bwaise III, and lastly Ntinda. Table 7.3 provides the correlation coefficients of these and other variables with the measure-specific coping appraisal elements explained above.

7.4.2 Association Between Social Vulnerability and Flood Coping Appraisal

Gender, age, household income, household size, size of the social network, the status of the house, the status of the land, and the highest level achieved by a family member constituted the social vulnerability component in this hypothesis (Bubeck et al., 2018). Tables 7.3 (Bwaise III), 7.4 (Natete), and 7.5 (Ntinda) above show that these and other explanatory variables covered in the subsequent sections have significant relationships with some coping appraisals of different mitigation measures. We found that gender was associated with self-efficacy in certain measures, though not in all cases. Females had lower perceived self-efficacy for raising power sockets (hereafter SE sockets) in Bwaise III and Ntinda but not in Natete. In Ntinda, females also had lower perceived self-efficacy for raising floor (hereafter, SE Rfloor or rebuilding) levels than men.

Older people perceive that they are more able to raise the floor/rebuild the house and/or clean the drainage in Bwaise III while in Ntinda people perceive the measure to be too costly compared to the younger age groups. In Natete, older people perceive capturing rainwater and clearing the drainage to be effective ways to mitigate against flooding compared to the younger age groups. It is however important to note that the age groups that include the aged (65+ years) had very few respondents and therefore, this conclusion should be adopted with caution.

Households that earn more perceive that they can raise the floor or rebuild the house, and raise power sockets in Bwaise III. They however perceive raising sockets and planting grass to be costly. In Natete, households which earn more perceive that they can raise the floor or rebuild and put goods in higher places, but not able to put up small dykes and piles of sandbags. In line with their perceptions of ability, they perceive putting

Table 7.2 Descriptive statistics for selected explanatory variables

	Bwaise III			*Natete*			*Ntinda*		
	Frequency	*Percent*	*Valid percent*	*Frequency*	*Percent*	*Valid percent*	*Frequency*	*Percent*	*Valid percent*
Status of house									
Valid Owner	79	51.3	51.6	127	51.2	53.1	120	59.7	59.7
Tenant	72	46.8	47.1	111	44.8	46.4	78	38.8	38.8
Usufruct	2	1.3	1.3	1	0.4	0.4	3	1.5	1.5
Total	153	99.4	100	239	96.4	100.0	201	100	100
Missing	1	0.6		9			9		
Total	**154**	**100**		**248**	**100**	**100**	**210**	**100**	
Gender									
Valid Female	38	24.7	24.8	88	35.5	36.5	76	36.2	36.4
Male	115	74.7	75.2	153	61.7	63.5	133	63.3	63.6
Total	**153**	**99.4**	**100**	**241**	**97.2**	**100**	**209**	**99.5**	**100**
Missing	1	0.6		7	2.8		1	0.5	
Household income									
Valid 0–40,000 UGX	15	9.7	10.8	73	29.4	31.7	39	18.6	19.5
40,001–80,000 UGX	36	23.4	25.9	25	10.1	10.9	21	10.0	10.5
80,001–120,000 UGX	39	25.3	28.1	13	5.2	5.7	16	7.6	8.0
120,001–160,000 UGX	23	14.9	16.5	16	6.5	7.0	13	6.2	6.5

	Bwaise III			*Natete*			*Ntinda*		
	Frequency	*Percent*	*Valid percent*	*Frequency*	*Percent*	*Valid percent*	*Frequency*	*Percent*	*Valid percent*
160,001–200,000 UGX	16	10.4	11.5	15	6.0	6.5	11	5.2	5.5
				8	3.2	3.5	10	4.8	5.0
240,001–280,000 UGX	1	0.6	0.7	16	6.5	7.0	13	6.2	6.5
				11	4.4	4.8	8	3.8	4.0
320,001–360,000 UGX	4	2.6	2.9	14	5.6	6.1	14	6.7	7.0
360,001 UGX and above	5	3.2	3.6	39	15.7	17.0	55	26.2	27.5
Total	139	90.3	100.0	230	92.7	100.0	200	95.2	100.0
Missing	15	9.7		18	7.3		10	4.8	
Total	**154**	**100**		**248**	**100**		**210**	**100.0**	
Highest education									
Valid None	2	1.3	1.4	6	2.4	2.5	1	0.5	0.5
Primary	30	19.5	20.4	32	12.9	13.5	12	5.7	6.1
High school	74	48.1	50.3	106	42.7	44.7	54	25.7	27.6
Tertiary	41	26.6	27.9	93	37.5	39.2	129	61.4	65.8
Total	147	95.5	100.0	237	95.6	100.0	196	93.3	100.0
Missing	7	4.5		11	4.4		14	6.7	
Total	**154**	**100.0**		**248**	**100.0**		**210**	**100.0**	

(continued)

Table 7.2 (continued)

	Bwaise III			*Natete*			*Ntinda*		
	Frequency	*Percent*	*Valid percent*	*Frequency*	*Percent*	*Valid percent*	*Frequency*	*Percent*	*Valid percent*
Flood severity									
Low	22	14.3	52.4	58	23.4	28.3	17	8.1	42.5
Medium	14	9.1	33.3	78	31.5	38.0	17	8.1	42.5
High	5	3.2	11.9	60	24.2	29.3	6	2.9	15.0
Extremely high	1	0.6	2.4	9	3.6	4.4	40	19.0	100.0
Total	42	27.3	100.0	205	82.7	100.0	170	81.0	
Missing	112	72.7		43	17.3		210	100.0	
Total	**154**	**100**		**248**	**100.0**		**17**	**8.1**	**42.5**

NB: 1 USD = 3500 UGX

Table 7.3 Correlations of predictor variables with elements of coping appraisal in Bwaise III

	SE rebuilding	*SE small dyke*	*SE Sandbags*	*SE capturing rainwater*	*SE raising sockets*	*SE planting grass*	*SE clearing drainage*	*SE goods high*
Gender					−0.19* 0.015 $N = 153$			
Age	0.165* 0.043 $N = 152$						0.183* 0.025 $N = 150$	
Distance from Channel								
Household income	0.232** 0.006 $N = 137$				0.362 0.000 $N = 139$			
Status of house			−0.238** 0.003 $N = 149$					
Status of Land					0.292* 0.06 $N = 88$		0.480** 0.00 $N = 88$	
Highest education					0.186* 0.024 $N = 147$			
Flood severity			0.379* 0.015 $N = 41$					
Flood-induced property damage			−0.177* 0.033 $N = 146$					

(continued)

Table 7.3 (continued)

	SE rebuilding	*SE small dyke*	*SE Sandbags*	*SE capturing rainwater*	*SE raising sockets*	*SE planting grass*	*SE clearing drainage*	*SE goods high*
Flood-induced health problems			−0.279** 0.001 *N* = 145	0.233** 0.004 *N* = 147		−0.195 0.018 *N* = 146		
Flood-induced financial costs	−0.209* 0.011 *N* = 146		0.270** 0.001 *N* = 144	−0.255** 0.002 *N* = 146		0.165* 0.048 *N* = 144	−0.168 0.044 *N* = 144	
Mitigation efforts before 2017	0.234** 0.005 *N* = 142	0.217** 0.01 *N* = 142			0.173* 0.038 *N* = 144			0.360** 0.000 *N* = 150
Looked for Information								
Received flood-related information				−0.188* 0.023 *N* = 146				
Willingness to spent on mitigation	0.214* 0.010 *N* = 144	0.167* 0.046 *N* = 144	0.245** 0.003 *N* = 143	0.188* 0.0024 *N* = 144			0.255** 0.002 *N* = 142	

	RE dykes	*RE capturing rainwater*	*RE putting goods high*	*IC clearing drainage*	*IC raising sockets*	*IC planting grass*	*IC small dyke*	*IC sandbags*	*IC capturing rainwater*	*IC goods high*
Gender										
Age										
Distance from Channel				0.173* 0.034 $N = 150$					−0.211** 0.009 $N = 152$	
Household income					0.224** 0.009 $N = 137$	0.206* 0.016 $N = 136$				
Status of house										
Status of Land			0.295** 0.005 $N = 88$				−0.399** 0.000 $N = 88$	−0.570** 0.000 $N = 88$	−0.223* 0.036 $N = 87$	0.228* 0.035 $N = 86$
Highest education										
Flood severity		0.460** 0.002 $N = 42$							0.346* 0.027 $N = 41$	
Flood-induced property damage		0.194* 0.018 $N = 148$								

(continued)

Table 7.3 (continued)

	RE dykes	*RE capturing rainwater*	*RE putting goods high*	*IC clearing drainage*	*IC raising sockets*	*IC planting grass*	*IC small dyke*	*IC sandbags*	*IC capturing rainwater*	*IC goods high*
Flood-induced health problems		−0.195* 0.018 N = 148								
Flood-induced financial costs		−0.169 0.041 N = 147		−0.173 0.038 N = 144				−0.200 0.015 N = 148		
Mitigation efforts before 2017								−0.253** 0.002 N = 144		0.239** 0.004 N = 141
Looked for Information	−0.283** 0.001 N = 146				−0.165 0.048 N = 145					
Received flood -related information	−0.283** 0.000 N = 146						0.227** 0.006 N = 146			
Willingness to spent on mitigation		0.237** 0.004 N = 145		0.175* 0.036 N = 142	0.200* 0.017 N = 142	0.202 0.016 N = 142		0.175* 0.035 N = 146		

* indicates significant correlation at 0.05 cofidence, and ** indicates significant correlation at 0.01 confidence.

Table 7.4 Correlations of predictor variables with elements of coping appraisal in Natete

	SE rebuilding	*SE small dyke*	*SE sandbags*	*SE capturing rainwater*	*SE raising sockets*	*SE planting grass*	*SE clearing drainage*	*SE goods high*
Age								
Gender								
Distance from Channel								
Household income	0.188**	−0.169*	−0.134*					0.262**
	0.005	0.011	0.045					0.000
	N = 222	*N* = 226	*N* = 225					*N* = 229
Status of house	−0.294**	−0.173**		−0.140*	−0.135*			
	0.000	0.008		0.031	0.039			
	N = 230	*N* = 233		*N* = 237	*N* = 234			
Status of Land	−0.374**	−0.338**	−0.336**	−0.335**	−0.310**		−0.489**	−0.371**
	0.000	0.001	0.001	0.001	0.002		0.000	0.000
	N = 95	*N* = 93	*N* = 92	*N* = 94	*N* = 93		*N* = 95	*N* = 95
Highest education	0.213**				0.223**			
	0.001				0.001			
	N = 228				*N* = 233			
Flood severity				−0.142*				0.235**
				0.044				0.001
				N = 203				*N* = 204
Flood-induced property damage	−0.253		−0.196**	−0.164*	−0.176**		−0.253**	−0.392**
	0.000		0.002	0.011	0.006		0.000	0.000
	N = 236		*N* = 238	*N* = 241	*N* = 239		*N* = 238	*N* = 242
Flood-induced health problems	−0.260	−0.206**	−0.302**	−0.239**			−0.386**	−0.240**
	0.000	0.001	0.000	0.000			0.000	0.000
	N = 235	*N* = 238	*N* = 238	*N* = 241			*N* = 238	*N* = 242

(continued)

Table 7.4 (continued)

	SE rebuilding	*SE small dyke*	*SE sandbags*	*SE capturing rainwater*	*SE raising sockets*	*SE planting grass*	*SE clearing drainage*	*SE goods high*
Flood-induced financial costs	−0.318 0.000 *N* = 234	−0.135* 0.038 *N* = 237	−0.307** 0.000 *N* = 237	−0.169** 0.009 *N* = 240	−0.208** 0.001 *N* = 238		−0.351** 0.000 *N* = 237	−0.308** 0.000 *N* = 241
Mitigation efforts before 2017	0.518 0.000 *N* = 214	0.262** 0.000 *N* = 217		0.223** 0.001 *N* = 221	0.284** 0.000 *N* = 218		0.148* 0.029 *N* = 218	0.313** 0.000 *N* = 222
Looked for flood information			0.204** 0.002 *N* = 234					
Received flood-related information								0.133* 0.047 *N* = 224
Willingness to spent on mitigation					0.230** 0.000 *N* = 234		0.192** 0.003 *N* = 234	
Household size	0.129 0.046 *N* = 238	0.137* 0.034 *N* = 241		0.142* 0.027 *N* = 244				
Distance from Channel								
Years at location	0. 189 0.003 *N* = 238				0.205** 0.001 *N* = 242	0.142* 0.028 *N* = 242		0.205** 0.001 *N* = 245
Size of social network	0.205 0.001 *N* = 238		0.268** 0.000 *N* = 241	0.126* 0.050 *N* = 244	0.146* 0.023 *N* = 242		0.177** 0.006 *N* = 241	0.138* 0.031 *N* = 245

	RE rebuilding	*RE dykes*	*RE sockets*	*RE capturing rainwater*	*RE moving away*	*RE Planting grass*	*RE putting goods high*	*RE Clearing drainage*
Age						0.153* 0.018 *N* = 240		
Gender								
Distance from Channel								
Household income		0.171* 0.010 *N* = 225	0.363** 0.000 *N* = 226	0.134* 0.045 *N* = 223			0.219** 0.001 *N* = 221	
Status of house								
Status of Land		−0.249 0.015 *N* = 94					−0.420** 0.000 *N* = 92	
Highest education						0.162* 0.014 *N* = 229	0.176** 0.008 *N* = 228	
Flood severity								
Flood-induced property damage						0.194** 0.003 *N* = 235		
Flood-induced health problems	−0.139* 0.031 *N* = 240					0.136* 0.037 *N* = 235		
Flood-induced financial costs	−0.131* 0.043 *N* = 239					0.175** 0.007 *N* = 234		

(continued)

Table 7.4 (continued)

	RE rebuilding	*RE dykes*	*RE sockets*	*RE capturing rainwater*	*RE moving away*	*RE Planting grass*	*RE putting goods high*	*RE Clearing drainage*
Mitigation efforts before 2017	0.168* 0.013 *N* = 219		0.210** 0.002 *N* = 220				0.182** 0.007 *N* = 215	
Looked for flood information	−0.193** 0.003 *N* = 235		−0.141* 0.031 *N* = 236					0.143* 0.029 *N* = 232
Received flood-related information					0.145* 0.033 *N* = 218		0.262** 0.000 *N* = 218	0.139* 0.040 *N* = 218
Willingness to spent on mitigation	0.297** 0.000 *N* = 234		0.166* 0.011 *N* = 235	0.141* 0.031 *N* = 233		0.189** 0.004 *N* = 232	0.188** 0.004 *N* = 231	
Household size								
Distance from Channel						0.152* 0.019 *N* = 240		
Years at location							0.170** 0.009 *N* = 238	
Size of social network								

	IC rebuilding and raising the floor	*IC small dyke*	*IC sandbags*	*IC raising sockets*	*IC planting grass*	*IC clearing drainage*	*IC capturing rainwater*	*IC moving away from*	*IC goods high*
Age									
Gender									
Distance from Channel									
Household income			−0.207** 0.002 $N = 227$						
Status of house									−0.158* 0.016 $N = 232$
Status of Land		−0.524** 0.000 $N = 94$	−0.314** 0.002 $N = 94$	−0.380** 0.000 $N = 93$	−0.279** 0.006 $N = 94$	−0.420** 0.000 $N = 94$		−0.287** 0.005 $N = 93$	−0.261* 0.011 $N = 93$
Highest education								0.156* 0.019 $N = 225$	0.236** 0.000 $N = 230$
Flood severity									
Flood-induced property damage	−0.127* 0.050 $N = 238$	−0.258** 0.000 $N = 240$		−0.188** 0.004 $N = 239$					
Flood-induced health problems		−0.308** 0.000 $N = 240$	−0.155* 0.016 $N = 240$	−0.219** 0.001 $N = 239$		−0.164* 0.011 $N = 240$			
Flood-induced financial costs		−0.320** 0.000 $N = 239$		−0.304** 0.000 $N = 239$		−0.144* 0.026 $N = 239$			
Mitigation efforts before 2017				0.164* 0.015 $N = 218$					0.144* 0.034 $N = 217$

(continued)

Table 7.4 (continued)

	IC rebuilding and raising the floor	*IC small dyke*	*IC sandbags*	*IC raising sockets*	*IC planting grass*	*IC clearing drainage*	*IC capturing rainwater*	*IC moving away from*	*IC goods high*
Looked for flood information		−0.206** 0.001 N = 237		−0.202** 0.002 N = 236	−0.211** 0.001 N = 234			−0.136* 0.041 N = 228	−0.145* 0.026 N = 235
Received flood-related information			0.228** 0.001 N = 223		0.132* 0.049 N = 221				0.177** 0.008 N = 221
Willingness to spent on mitigation		0.302** 0.000 N = 236		0.333** 0.000 N = 235	0.160* 0.014 N = 234		0.187** 0.004 N = 237	0.191** 0.004 N = 230	0.197** 0.003 N = 233
Household size									
Distance from Channel									
Years at location							−0.135* 0.035 N = 243		
Size of social network		0.128* 0.046 N = 243							

* indicates significant correlation at 0.05 confidence and ** indicates significant correlation at 0.01 confidence.

Table 7.5 Correlations of predictor variables with elements of coping appraisal in Ntinda

	SE rebuilding	*SE small dyke*	*SE sandbags*	*SE capturing rainwater*	*SE raising sockets*	*SE planting grass*	*SE clearing drainage*	*SE Moving away*	*SE goods high*
Gender		−0.177* 0.011 *N* = 204			−0.146* 0.037 *N* = 205				
Age									
Distance from Channel									
Household income	0.164* 0.023 *N* = 194			−0.161 0.024 *N* = 198	0.148* 0.039 *N* = 196			−0.149* 0.039 *N* = 193	
Status of house						−0.199** 0.005 *N* = 198			
Status of Land		−0.472** 0.001 *N* = 44		−0.359* 0.015 *N* = 45		−0.366* 0.015 *N* = 44	−0.320* 0.032 *N* = 45		
Highest education			−0.306** 0.000 *N* = 192	−0.183* 0.011 *N* = 194			−0.210** 0.003 *N* = 193	−0.250** 0.001 *N* = 190	−0.240** 0.001 *N* = 191
Flood severity									
Flood-induced property damage	−0.306** 0.000 *N* = 200	−0.291** 0.000 *N* = 201	−0.340** 0.000 *N* = 201				−0.223** 0.001 *N* = 202	−0.172* 0.015 *N* = 199	−0.220** 0.002 *N* = 200
Flood-induced health problems	−0.201** 0.004 *N* = 201		−0.232** 0.001 *N* = 202	0.165* 0.036 *N* = 162			−0.273** 0.000 *N* = 203		
Flood-induced financial costs	−0.310** 0.000 *N* = 200	−0.210** 0.003 *N* = 201	−0.373** 0.000 *N* = 201				−0.312** 0.000 *N* = 202	−0.176* 0.013 *N* = 199	

(continued)

Table 7.5 (continued)

	SE rebuilding	*SE small dyke*	*SE sandbags*	*SE capturing rainwater*	*SE raising sockets*	*SE planting grass*	*SE clearing drainage*	*SE Moving away*	*SE goods high*
Mitigation efforts before 2017	0.367 0.000 $N = 158$	0.269** 0.001 $N = 159$	0.348** 0.000 $N = 160$	0.165 0.036 $N = 162$	0.244** 0.002 $N = 160$	0.269** 0.001 $N = 161$	0.391** 0.000 $N = 163$		0.351** 0.000 $N = 159$
Looked for information	−0.214** 0.002 $N = 202$								
Received flood-related information				−0.165* 0.020 $N = 198$	0.162* 0.023 $N = 196$		−0.159* 0.026 $N = 197$		
Willingness to spent on mitigation	0.440** 0.000 $N = 195$	0.203** 0.004 $N = 197$	0.315** 0.000 $N = 198$		0.188** 0.008 $N = 198$	0.153* 0.031 $N = 199$	0.377** 0.000 $N = 198$		0.263** 0.000 $N = 197$
Distance from channel			−0.210** 0.002 $N = 206$					−0.206** 0.003 $N = 203$	−0.244** 0.000 $N = 205$
Size of social network	0.174* 0.013 $N = 204$								
Age							0.196** 0.005 $N = 207$		
Household size				0.150* 0.031 $N = 208$		0.164 0.018 $N = 207$	0.180** 0.009 $N = 207$	−0.164* 0.019 $N = 203$	
Years at location					0.145* 0.038 $N = 206$	0.165* 0.017 $N = 207$			

	RE rebuilding	*RE Dykes*	*RE Sandbags*	*RE Raising sockets*	*RE Planting grass*	*RE capturing rainwater*	*RE clearing drainage*	*RE moving away*	*RE putting goods high*
Gender									
Age						0.138* 0.046 N = 208	0.151* 0.030 N = 208		
Distance from Channel									
Household income		0.196** 0.006 N = 199		0.195** 0.006 N = 196	0.173* 0.014 N = 199				0.145* 0.041 N = 199
Status of house									
Status of Land									
Highest education		0.198** 0.005 N = 195			0.341** 0.000 N = 195	0.283** 0.000 N = 192		0.177** 0.014 N = 192	0.272** 0.000 N = 196
Flood severity								0.352* 0.028 N = 39	
Flood-induced property damage									
Flood-induced health problems					0.226** 0.001 N = 205	0.171* 0.015 N = 202		0.156* 0.026 N = 202	0.202** 0.004 N = 206
Flood-induced financial costs					0.245** 0.000 N = 204				
Mitigation efforts before 2017		0.227**	0.160*			0.215**			0.161*

(continued)

Table 7.5 (continued)

	RE rebuilding	*RE Dykes*	*RE Sandbags*	*RE Raising sockets*	*RE Planting grass*	*RE capturing rainwater*	*RE clearing drainage*	*RE moving away*	*RE putting goods high*
		0.004 $N = 162$	0.044 $N = 160$			0.006 $N = 159$			0.040 $N = 163$
Looked for information	−0.158* 0.022 $N = 208$	−0.241** 0.000 $N = 207$	−0.301** 0.000 $N = 205$						−0.156* 0.025 $N = 207$
Received flood-related information						−0.240** 0.001 $N = 204$			0.159 0.025 $N = 199$
Willingness to spent on mitigation	−0.187** 0.008 $N = 200$	−0.152* 0.032 $N = 199$			−0.146* 0.040 $N = 199$	−0.293** 0.000 $N = 196$	−0.227** 0.001 $N = 198$	−0.243** 0.001 $N = 196$	−0.300** 0.000 $N = 199$
Distance from channel									
Size of social network					0.185** 0.007 $N = 209$			0.187** 0.007 $N = 205$	
Age									
Household size						−0.186 0.007 $N = 206$		−0.169* 0.015 $N = 205$	−0.205** 0.003 $N = 209$
Years at location						−0.149 0.033 $N = 206$			

	IC clearing drainage	*IC raising sockets*	*IC planting grass*	*IC rebuilding*	*IC small dyke*	*IC sandbags*	*IC capturing rainwater*	*IC moving away*	*IC goods high*
Gender									−0.183** 0.009 N = 203
Age									
Distance from Channel									
Household income							−0.195** 0.006 N = 196		
Status of house					−0.369* 0.013 N = 45			0.181* 0.015 N = 181	
Status of Land		−0.356* 0.017 N = 45					−0.476** 0.001 N = 45	−0.413** 0.005 N = 45	
Highest education							−0.241** 0.001 N = 192		0.147* 0.042 N = 192
Flood severity									
Flood-induced property damage							−0.216** 0.002 N = 201		
Flood-induced health problems							−0.331** 0.000 N = 202		

(continued)

Table 7.5 (continued)

	IC clearing drainage	*IC raising sockets*	*IC planting grass*	*IC rebuilding*	*IC small dyke*	*IC sandbags*	*IC capturing rainwater*	*IC moving away*	*IC goods high*
Flood-induced financial costs						−0.144* 0.040 N = 204	−0.241** 0.001 N = 201		
Mitigation efforts before 2017				0.207** 0.009 N = 160			0.160* 0.044 N = 159		
Looked for information						−0.151* 0.030 N = 207			
Received flood-related information			0.186** 0.008 N = 199	0.167* 0.020 N = 196	0.341** 0.000 N = 198	0.147* 0.038 N = 199		0.180* 0.016 N = 181	0.152* 0.034 N = 195
Willingness to spent on mitigation		0.161* 0.023 N = 198	0.156* 0.028 N = 199			0.305** 0.000 N = 199	0.317** 0.000 N = 194		
Distance from channel				−0.188** 0.007 N = 206			−0.184** 0.008 N = 204		
Size of social network		0.279** 0.000 N = 208				0.266** 0.000 N = 209		0.153* 0.036 N = 189	0.237** 0.001 N = 204
Age									
Household size									
Years at location				−0.199** 0.004 N = 206				−0.233** 0.001 N = 189	

* indicates significant correlation at 0.05 confidence and ** indicates significant correlation at 0.01 confidence.

goods in higher places and raising sockets to be effective measures against flood damage while to them, sandbags are costly to implement. They further perceive capturing rainwater as an effective measure. Surprisingly, they perceive small dykes to be effective as well.

Homeowners were found to perceive themselves as more able to put up piles of sandbags in Bwaise III. In Natete, they have a high perceived ability to raise the floor or rebuild the house, put up a small dyke, capture rainwater, and plant grass.

The highest education level attained by a household member is positively associated with perceived self-efficacy for raising sockets in Bwaise III and Natete. Over and above, in Natete, highest education was positively associated with perceived self-efficacy for raising the floor or rebuilding and raising sockets; perceived response efficacy for planting grass and clearing drainage; and perceived implementation costs for moving away and putting goods high. In Ntinda, highest education was positively associated with perceptions of response efficacy for putting up small dykes, planting grass, capturing rainwater, moving away, putting goods high, and perceived implementation costs for putting goods in higher places. It is negatively associated with perceived self-efficacy for putting up piles of sandbags; capturing rainwater; clearing drainage; and temporarily moving away. It is also negatively associated with perceived implementation costs for capturing rainwater.

Other variables related to social vulnerability (i.e. household size and size of social network) have significant relationships with coping appraisals in Natete and Ntinda. In Natete, the bigger the household size, the higher the perceptions of perceived self-efficacy for raising the floor or rebuilding the house, putting up a small dyke, and capturing rainwater. The bigger the social network, the higher the self-efficacy for raising the floor or rebuilding the house, putting up sandbags, capturing rainwater, planting grass, and clearing the drainage. Bigger social networks are also positively correlated with perceived implementation costs for putting up a small dyke. In Ntinda, the bigger the household size the higher the perceived self-efficacy for capturing rainwater, planting grass, and clearing drainage; and the lower the perceived self-efficacy for moving away. Bigger households are also negatively correlated to perceived response efficacy for capturing rainwater, moving away to safe places, and raising goods high. The bigger the social network the higher the: perceived self-efficacy for raising the floor or rebuilding the house; perceived response efficacy for planting grass; and response efficacy for moving away. Perceived implementation costs for raising sockets, putting up sandbags, moving away, and raising goods high are also positively correlated with bigger social networks.

7.4.3 Influence of Flood Severity and Loss on Perceptions Self-Efficacy, Response Efficacy, and Implementation Costs

Flood severity is associated with coping appraisal elements for very few measures. In Bwaise III, it positively associates with SE sandbags, RE capturing rainwater, and IC capturing rainwater. In Natete, the higher the flood severity, the lower the perception of self-efficacy for capturing rainwater, and in contrast, the same is associated with a higher perception of self-efficacy for elevating goods. In Ntinda residents who suffered high flood severity perceived moving away as an effective way of mitigating the impacts of floods.

Homeowners and residents who experienced flood-related property damage in Bwaise III perceived themselves as unable to pile up sandbags but, at the same time, perceived capturing rainwater to be an effective flood mitigation measure. In Natete, having suffered flood-related property damage is associated with perceptions of low self-efficacy for Rfloor or rebuilding, piling up sandbags, capturing rainwater, raising sockets, clearing drainage, and putting goods high. At the same time, people who suffered flood-related property damage perceive planting grass to be an effective mitigation measure. They also perceive the costs of putting up small dykes, raising sockets, and clearing drainage to be lower. In Ntinda, having suffered flood-related property damage is associated with perceptions of lower self-efficacy for Rfloor or rebuilding, small dyke, sandbags, clearing the drainage, moving away, and putting goods high. Households that suffered such damage also perceive the costs of capturing rainwater to be lower.

Having suffered from flood-related health problems largely associated negatively with all coping appraisal elements with which it manifests significant relationships in Bwaise III and Natete. In the former, households that suffered it have lower SE for putting up sandbags and plating grass and higher SE for capturing rainwater. It also leads to perceptions of lower RE for capturing rainwater. In Natete, having suffered flood-related health problems is associated with lower SE for Rfloor or rebuilding, small dyke, sandbags, capturing rainwater, clearing drainage, and putting goods high. It is also associated with lower RE for Rfloor or rebuilding, but higher RE for planting grass. Lastly, it associates with lower IC for small dykes, raising sockets, and clearing drainage. In Ntinda, it negatively associates with SE for Rfloor or rebuilding, sandbags, and clearing drainage, but positively relates with SE capturing rainwater. It also positively relates to RE planting grass, capturing rainwater, moving away, and putting goods high. In terms of implementation costs, it is negatively associated with capturing rainwater.

Homeowners and residents who incurred flood-related financial costs have perceptions of lower SE for Rfloor, capturing rainwater, and clearing drainage; and higher SE for sandbags and planting grass in Bwaise III. They also have lower RE for capturing rainwater, clearing drainage, and IC for sandbags. In Natete and Ntinda, suffering flood-related financial costs has a negative association (significant relationships considered) with coping appraisals of all but one measure (RE planting grass). In the former, it is negatively associated with SE Rfloor or rebuilding, small dykes, sandbags, capturing rainwater, clearing drainage, raising goods high; RE Rfloor or rebuilding; and IC small dykes, raising sockets, and clearing drainage. In the latter, it is negatively associated with SE for Rfloor or rebuilding, small dykes, sandbags, clearing drainage, moving away, and IC sandbags capturing rainwater.

Distance from the drainage channel has significant relationships with very few appraisals, especially in Bwaise III and Natete. In Bwaise III, the longer the distance from the channel, the higher the perceptions of implementation costs for clearing the drainage channel, and the lower the perceptions of implementation costs for capturing rainwater. In Natete, the longer the distance from the channel, the higher the perception of response efficacy for planting grass. In contrast, the variable is negatively correlated with all the appraisals (where the relationship is significant) in Ntinda. These are SE sandbags, SE moving away, SE raising goods high, IC Rfloor or rebuilding, and IC capturing rainwater.

The longer households have lived at their current location, the higher the perceptions of SE for Rfloor or rebuilding, sandbags, raising sockets, planting grass, raising goods high; and RE for raising goods high in Natete. The variable however relates negatively with perceptions of implementation costs of capturing rainwater. In Ntinda, living in a place longer positively correlates with perceptions of SE for raising sockets and for panting grass, but negatively correlates to perceptions of RE for capturing rainwater, IC for Rfloor or rebuilding, and IC for moving away.

7.4.4 *Influence of Receiving/Looking for Flood-Related Information on Perceptions of Self-Efficacy, Response Efficacy, and Implementation Costs*

In Natete, flood-related information seeking is positively correlated with perceptions of SE for putting up sandbags and RE for raising goods high; negatively correlated to perceptions of RE for Rfloor or raising the house and for raising sockets, IC for small dykes, raising sockets planting grass, moving away, and raising goods high. In Ntinda, it negatively correlates with perceptions of SE for Rfloor or rebuilding, RE for Rfloor or rebuilding, RE for small dykes, planting grass, raising goods high, and for sandbags and IC sandbags.

Having received flood-related information in Natete is positively related to SE raising goods high, RE moving away, RE raising goods high, RE clearing drainage, IC sandbags, IC planting grass, and IC raising goods high. In Ntinda, it is positively related to SE raising sockets high and negatively correlated to SE capturing rainwater; SE clearing drainage and RE capturing rainwater. It is also positively correlated to RE raising goods high, IC for planting grass, Rfloor or rebuilding, small dyke, sandbags, moving away, and raising goods high.

7.4.5 *Influence of Risk Aversion (Willingness to Spent on Mitigation) on Perceptions of Self-Efficacy, Response Efficacy, and Implementation Costs*

Risk aversion is generally positively correlated with appraisals for more measures compared to any other explanatory variable (i.e. when one combines responses from the three case study areas). In Bwaise III, it is positively related to perceptions of SE for Rfloor, small dykes, sandbags, capturing rainwater, and clearing drainage; RE for capturing rainwater; and IC clearing the drainage, raising sockets, planting grass, and putting up sandbags. In Natete, it positively correlates with perceptions of SE for raising sockets and clearing drainage; RE of Rfloor or rebuilding, raising sockets, capturing rainwater, and planting grass; and IC small dykes, raising sockets, planting grass, capturing rainwater, moving away, and raising goods high. In Ntinda, it positively correlates with perceptions of SE for Rfloor or rebuilding, small dykes, sandbags, planting grass, raising sockets, clearing drainage, and raising goods high; and IC raising sockets, planting grass, sandbags, and capturing rainwater. It is, however, negatively related to RE of Rfloor or rebuilding, small dykes, planting grass, capturing rainwater, clearing drainage, moving away, and raising goods high.

7.4.6 *Influence of Existing Mitigation Measures on Perceptions of Self-Efficacy, Response Efficacy, and Implementation Costs*

Having existing mitigation measures is by and large related to positive appraisals in all three case study areas. It is positively related to perceptions of Self-efficacy for Rfloor, small dykes, raising sockets, and raising goods high, and IC raising goods high in Bwaise III. It has a negative association with perceptions of IC sandbags only. In Natete, it shows a positive association with all appraisals with which the relationship is significant. These are self-efficacy for Rfloor or rebuilding, small dykes, capturing rainwater, raising sockets, clearing drainage, and raising goods high; RE of Rfloor or rebuilding, raising sockets, capturing rainwater, and clearing drainage; IC raising sockets and putting goods high. In Ntinda, it positively correlates with SE for Rfloor or rebuilding, small dykes, sandbags, capturing rainwater, clearing drainage, raising sockets, planting grass, clearing drainage and raising goods high; RE dykes, sandbags, capturing rainwater, and raising goods high; and IC Rfloor or rebuilding and capturing rainwater.

7.5 Regression Analyses of Flood Coping Appraisals

We ran 72 models for all coping appraisal elements per measure and only 18 (4 for Bwaise III, 8 for Natete, and 6 for Ntinda) satisfied all fitness criteria. That is having a difference between the final model and the 'intercept only' model with a p-value lower than 0.05; passed the goodness of fit test ($p > 0.05$); and the test of parallel lines ($p > 0.05$). For more on this, please refer to supplementary material. In the next section, we present results from the 18 models, the amount of variation in the coping appraisal element explained in them, the explanatory variables with significant p values, and their levels' proportional odds ratios of influence on the levels of the dependent variables.

In Bwaise, models for SE clearing drainage (Nagelkerke R Square: 0.337), SE raising goods high (N. R Square: 0.187), SE capturing rainwater (N. R Square: 0.220), and RE small dykes (N. R Square: 0.136) fulfilled the above-mentioned criteria (Table 7.6).

Table 7.6 Significant proportional odds ratios of influence in the coping appraisal models in Bwaise III

Model	*Influencing factors and direction of influence*	*Proportional odds*	*Wald statistic*	*p-value*
SE clearing drainage	*Willingness to spent*			
	Not willing (−)	0.30	10.800	0.001
	Somewhat willing			
SE raising goods high	*Implemented measures before 2017*			
	Nothing (−)	0.06	13.282	0.000
	Communitarian			
SE capturing rainwater	*Received flood-related information*			
	Yes (+)	3.60	8.758	0.005
	No			
	Willingness to spent on mitigation			
	Somewhat willing (−)	0.12	3.879	0.049
	Willing			
RE small dykes	*Looked for flood-related information*			
	Yes (+)	6.00	11.757	0.010
	No			
	Received flood-related information			
	Yes (−)	0.40	6.268	0.012
	No			

From Table 7.6, one can observe that generally very few explanatory variables had a significant influence on very few levels likewise. For SE clearing drainage, willingness to spend on mitigation showed significant negative influence in the lower levels—those who were not willing were 0.3 times less likely to have a higher perception of ability compared to those who were somewhat willing. For SE raising goods high, measures implemented before 2017 had significant a negative influence on the lower levels as well. Households which had done nothing were 0.06 times less likely to have a higher perception compared to those who had been involved in communitarian mitigation. Regarding perceptions of SE capturing rainwater, receiving flood-related information and willingness to spend had positive and negative significant influences respectively. Households which had received information about flooding were 3.6 times more likely to perceive themselves as able compared to those who had not, and those who were somewhat willing were 0.12 times less likely to perceive themselves as able. Regarding perceptions of RE for small dykes, households which had looked for flood-related information were 6 times more likely to perceive the measure as effective compared to those which had not. Those who had received flood-related information were 0.4 times less likely to perceive small dykes as effective compared to those who had not.

Table 7.7 shows the regression outputs for Natete. One can observe that, the SE Rfloor or rebuilding, SE small dykes, SE sandbags, SE capturing rainwater, SE raising goods high, RE Rfloor and rebuilding, RE moving away, IC Capturing rainwater models fulfilled fitness criteria. The first column provides the N. *R* Square values of these models which indicate the amount of variation in the dependent variables attributable to change in the scale levels of explanatory variables. The second column provides the explanatory variables, their levels, and the direction of influence of these levels (from the bottom upwards) on the dependent variables (coping appraisal elements). In the third column, the proportional odds of these influences are provided with their significance values provided in column 5.

In the first model, the N. *R* square is the highest. To begin with, household income has a small significant negative influence across 8 of the 10 levels. The highest influence is in the 240,001–280,000 UGX income bracket. Households in this bracket were 0.014 times less likely to perceive themselves as able, compared to those who earned between 280,001 and 320,000 UGX. The cumulative influence of the other levels can be deduced by observing the proportional odds column likewise.

Mitigation measures implemented before 2017 also had a negative influence on the perceptions of self-efficacy for Rfloor/rebuilding the house. Households that had at most put up a dyke/heap of sandbags were 0.07 times less likely to perceive themselves as able to raise the floor or rebuild the house compared to those who had actually implemented the measure. Households that had at most raised sockets were 0.06 times less likely to perceive themselves as able compared to those who had put up at most a small dyke/hip of sandbags. In turn, households that had at the most implemented non-structural measures like moving away or putting goods in higher places were 0.08 times less likely to perceive themselves as able to raise the floor or rebuild the house compared to those who had at most managed to raise their sockets. One can therefore conclude that perception of the ability to implement the most effective mitigation measure is strongly influenced by perceptions of self-efficacy.

With regards to the SE small dykes model, past mitigation efforts, the status of the house, and income had significant contributions to

Table 7.7 Significant proportional odds ratios of influence in the coping appraisal models in Natete

Model	*Influencing factors and direction of influence*	*Proportional odds*	*Wald statistic*	*p-value 95% confidence*
SE Rfloor/rebuilding N. *R* Square: 0.59	*Income*			
	0–40,000 UGX (−)	0.009	7.256	0.007
	40,001–80,000 UGX			
	80,001–120,000 UGX (−)	0.004	6.696	0.010
	120,001–160,000 UGX (−)	0.011	5.684	0.017
	160,001–200,000 UGX (−)	0.003	8.418	0.004
	200,001–240,000 UGX			
	240,001–280,000 UGX (−)	0.014	5.083	0.024
	280,001–320,000 UGX (−)	0.006	6.287	0.012
	320,001 UGX–360,000 UGX (−)	0.009	5.546	0.019
	360,001 and above			
	Implemented measures before 2017			
	Moving away/putting goods high (−)	0.008		
	Raised sockets (−)	0.06	6.227	0.0013
	Small dyke/sandbag (−)	0.07	19.127	0.00
SE small dykes (N. *R* Square: 0.322)	*Implemented measures before 2017*			
	Done nothing (–)	0.5	6.525	0.011
	Communitarian	0.008		
	Raised sockets (−)	0.08	8.667	0.003
	Small dyke/sandbag (−)	0.07	19.127	0.000
	Rfloor/rebuilding the house			

Model	*Influencing factors and direction of influence*	*Proportional odds*	*Wald statistic*	p-*value* *95% confidence*
	Homeownership			
	Homeowners (−)	6	2316	0.000
	Tenants			
	Income			
	40,001 UGX–80,000 UGX (−)	5	5.302	0.021
SE Sandbags	*Looked for flood-related information*			
(N. *R* Square: 0.307)	Yes (+)	3.2	13.402	0.000
	No			
	Experienced flood-related costs			
	Yes (−)	3	6.464	0.011
	No			
	Experienced flood-related health problems			
	Yes (−)	2	4.484	0.034
	No			
SE Capturing rainwater	*Experienced flood-related property damage*			
(N. *R* Square: 0.212)	Yes (−)	3	6.607	0.010
	No			
	Flood severity			
	Experienced flooding to feet level for less than 3 days (−)	18	5.558	0.018
	Experienced flooding up to Knee height			

(continued)

Table 7.7 (continued)

Model	*Influencing factors and direction of influence*	*Proportional odds*	*Wald statistic*	*p-value 95% confidence*
SE raising goods high (N. *R* Square of 0.426)	*Experienced flood-related property damage*			
	Yes (+)	6	9.977	0.002
	No			
	Size of social network			
	One household (+)	4	4.352	0.037
	2–3 households			
	5–6 households (+)	7	6.155	0.013
	Mitigation measures before 2017			
	Done nothing (−)	0.04	6.82	0.009
	Communitarian			
	Small dyke (−)	3.7	5.412	0.020
	Rfloor/rebuilding the house			
	Homeownership			
	Homeowners (+)	33,000,000	1759	0.000
	Tenants			
RE Rfloor/rebuilding the house (N. *R* Square: 0.330)	*Homeownership*			
	Homeowners (+)	5	1.022	0.000
	Tenants			
RE Moving away (N. *R* Square: 0.022)	*Received information about flooding*			
	Yes (+)	0.6	4.360	0.03
	No			
IC Capturing rainwater (N. *R* Square: 0.070)	*Willingness to spent on mitigation*			
	Not willing (−)	4	8.976	0.003
	Somewhat willing			

explaining the variation. The table above illustrates that households that had at most raised the sockets were 0.8 times less likely to perceive themselves as able compared to those that had put up a pile of sandbags or built a dyke. Those who had done nothing at all were 0.5 times less likely to perceive themselves as able compared to those who had implemented communitarian measures. Homeowners were six times more likely to perceive themselves as able compared to tenants and households that earned 40,001–80,000. In turn, those in the latter were 5 times more likely to perceive themselves as able compared to those who earned 80,001—120,000 UGX. In summary, households that had not put up a small dyke or a pile of sandbags were unlikely to perceive themselves as able to implement it, and having a secure property tenure, and a higher income is likely to influence a positive perception of the ability to put up the measure.

Having looked for flood-related information, having suffered flood-related health problems, and having incurred flood-related financial costs, significantly explain variation in the SE sandbags model. Households which had looked for information were 0.2 times more likely to perceive themselves as able compared to those which had not. Those who had incurred flood-related financial costs were 3 times less likely to perceive themselves as able compared to those who had not, and those who had suffered flood-related health problems were 2 times less likely to perceive themselves as able. Therefore, information-seeking behavior positively influences how one judges his ability to put up sandbags while flood-related loss and health problems negatively influence the judgment.

In the SE capturing rainwater model, flood severity and flood-related property damage significantly explain variation in the coping appraisal element. Households that had experienced flood depth up to feet level for less than 3 days were 18 times less likely to perceive themselves as able compared to those who had experienced flooding up to knee height. In other words, households that suffered more severe floods were likely to perceive themselves as able to capture rainwater. Having incurred flood-related property damage caused households to view themselves as unable to capture rainwater. Households that suffered damage were 3 times less likely to perceive themselves as able compared to those which had not.

The SE raising goods high model had the second-highest Nagelkerke *R* Square suggesting a significant amount of variation explained by the independent variables. This is also evident in the high proportional odds of changes in the dependent variable levels relative to the changes in the explanatory variable levels. The explanatory variables which significantly influenced the coping appraisal elements to include flood-related property damage, size of the social network, past mitigation, having received information, and status of the house. Households that had experienced flood-related property damage were 6 times more likely to perceive themselves as able compared to those who did not. Surprisingly, households that had a network of between 5 and 6 households were seven times more likely to perceive themselves as able compared to those who had six-plus. Households that were networked to only one household were 4 times more likely to perceive themselves as able compared to those who were networked to 2–3 households.

Households that had at most put up a dyke or heap of sandbags were 3.7 times less likely to perceive themselves as able compared to those who had raised the floor or rebuilt the house. Households which had done nothing were 0.04 times less likely to perceive themselves as able compared to those who had participated in communitarian measures. The status of the house had a very high influence on the perception of the ability to raise goods high. Homeowners were 32,736,460 times more likely to perceive themselves as able compared to tenants.

For the RE Rfloor and rebuilding model, the status of the house is the only explanatory variable that shows a significant contribution. Homeowners were five times more likely to perceive the measure as effective compared to tenants. The model for RE moving away also has only one explanatory variable—received flood-related information. The results show that households which had received information about floods were 0.6 times more likely to perceive moving away to a safe place as an effective measure compared to those which had not.

In the IC Capturing rainwater model, only willingness to spend on mitigation showed a significant contribution in explaining the variation. Households which were not willing to spend were 4 times less likely to perceive it as a costly measure compared to those which were somewhat willing.

The appraisal models that fulfilled fitness criteria were fewer—6 in Ntinda. Table 7.8 presents the proportional odds of changes in the coping appraisal elements relative to changes in the levels of explanatory variables.

In the SE capturing rainwater model, past mitigation measures showed significant influence on the changes across the levels of the coping appraisal element. Households which had at most put up a dyke or a pile of sandbags were 3 times more likely to perceive themselves as able

Table 7.8 Significant proportional odds ratios of influence in the coping appraisal models in Ntinda

Model	*Influencing factors and levels*	*Proportional odds*	*Wald statistic*	p-*value*
SE capturing rainwater	*Mitigation measures before 2017*			
(N. *R* Square: 0.39)	Done nothing (−)	0.027	9.505	0.002
	Communitarian			
	Raised sockets	4	6.111	0.013
	Small dyke (−)	3	3.901	0.048
	Rfloor/rebuilding the house			
RE Rfloor/rebuilding	*Looked for information*			
(N. *R* Square: 0.105)	Yes (−)	4.5	6.480	0.011
	No			
	Willingness to spend on mitigation			
	Not willing (+)	4	9.579	0.002
	Somewhat willing			
RE moving away	*Size of social network*			
(N. *R* Square: 0.597)	0 households (−)	0.06	3.934	0.047
	1–2			
IC small dyke	*Received flood-related information*			
(N. *R* Square: 0.112)	Yes (+)	0.3	19.568	0.000
	No			
IC Sandbags	*Looked for information*			
(N. *R* Square: 0.218)				
	Yes (−)	3	6.651	0.010
	No			
	Size of social network			
	0 households (+)	0.3	6.392	0.011
	1–2			
	Willingness to spend on mitigation			
	Not willing (+)	0.3	9.856	0.002

(continued)

Table 7.8 (continued)

Model	*Influencing factors and levels*	*Proportional odds*	*Wald statistic*	p-*value*
	Somewhat willing			
IC raising goods high (N. *R* Square: 0.144)	*Size of social network*			
	0 households (+)	0.27	71677	0.006
	1–2			
	Gender			
	Male (−)	1.8	4.022	0.045
	Female			

compared to those who had raised the floor or rebuilt the house. Those who had at most raised their sockets were 4 times more likely to perceive themselves as able compared to those who had put up a small dyke or pile of sandbags. Lastly, households that had done nothing were 0.027 less likely to perceive themselves as capable compared to those that had participated in communitarian measures. One can observe that it is only those who had done nothing at all who were less likely to perceive themselves as able to capture rainwater.

In the RE Rfloor or rebuilding model, households which had looked for flood-related information were 4.5 times less likely to perceive the measure as effective compared to those that did not. Risk aversion, measured by the level of willingness to spend on mitigation had a positive influence on perceptions of response efficacy for this measure. Those who were not willing were 4 times more likely to perceive the measure as effective compared to those who were somewhat willing. The RE moving away from the current premises model had the size of social network as the only explanatory variable showing significant influence. Households which had no social network were 0.06 times less likely to perceive the measure as effective compared to those that were connected to between 1 and 2 members. This confirms the importance of having friends and relatives who can accommodate one's family during floods.

In the IC small dyke model, receiving flood information positively influences perceptions of implementation costs of small dykes. Households which received flood-related information were 0.3 times more likely to perceive the measure as costly compared to those that had not received it. The IC sandbags model has four variables with significant contribution—the size of the social network, willingness to mitigate, having looked for flood-related information, and having received flood-related information. Households with no social network were 0.3 times more likely to perceive the measure as costly compared to those networked with between 1 and 2 households.

Willingness to implement also positively influences perceptions of implementation costs of small dykes. Households which were not willing to spend on mitigation were 0.3 times more likely to perceive the measure as costly compared to those that were somewhat willing. Those that looked for flood-related information were 3 times less likely to perceive the measure as costly compared to those that did not. Households which received flood-related information were 0.46 times more likely to perceive the measure as costly to implement compared to those that did not.

Regarding IC raising goods high, males were 1.8 times less likely to perceive the measure as costly than females, and households which had no social network were 0.27 times more likely to perceive the measure as costly compared to those networked to between 1 and 2 households.

7.6 Discussion

The results show that the contribution of most appraisal factors in the models is in line with the assumptions in the conceptual framework and other findings in the literature. In this section, we discuss these relationships taking note of the differential contribution in the rank levels in the data to provide policy-specific recommendations for different groups of respondents.

The finding that females perceive lower self-efficacy for structural measures than males in all the three case study areas is in line with other findings from the African context in the literature (Adzawla et al., 2019). Given that implementation of many structural measures is labor-intensive, less muscular genders would naturally perceive lower self-efficacy regardless of case-specific attributes as in Sultana (2010). The contribution of age is in contrast with Bubeck et al.'s (2013) and Fox-Rogers et al.'s (2016) observation that it negatively relates to SE structural measures in Europe. Older people in Bwaise III perceive themselves as able to raise the floor or rebuild the house. Regarding implementation costs, our study concurs with part of these authors' findings that it positively contributes to high-cost perceptions. By and large, our findings confirm the findings in the literature about income that it positively contributes to perceptions of SE and RE for structural measures and non-structural measures, but negatively to perceptions of IC for non-structural measures. The cumulative odds in the SE Rfloor or raising the house were very small though. Our study further established that the same relationship exists with structural measures, especially putting a barricade of sandbags. However, income negatively correlates with perceptions of SE for lower-cost structural measures, i.e. small dykes and sandbags in Natete. This can be explained by the context of informality—where the less the income one has, the less likely he/she can hire specialized help, and the more he/she believes that he/she can do it herself and vice versa. Like what obtains in the literature, tenure security in terms of the status of house occupation positively relates with perceptions of SE sandbags in Bwaise and for Rfloor, small dyke in Natete. Additionally, in our case, it also positively contributes to SE capturing rainwater and planting grass. By extension, this shows that tenants are not much prepared to make any investments, even small ones. This observation is strengthened by the comments which were given in which some tenants indicated that any improvement was the responsibility of the landlord/lady.

In the literature, education is documented as contributing to lower perceptions of SE and RE for structural measures which our results contrast, especially those from the 2 slum areas. However, our results from Ntinda—the affluent neighborhood partly concur with this association. This can be explained by the fact that the characteristics of respondents in that area are almost similar to those studied in the cited literature in terms of social status. Regarding the size of the social network, our findings confirm Bubeck et al.'s (2013) findings of a positive contribution to perceptions of SE and RE for both structural and non-structural measures but are not in agreement with its negative contribution to perceptions of implementation costs for non-structural measures documented in the literature. The positive contribution of perceptions of IC for non-structural measures can signal the fact that when the emergency hits, altruism will not exist. A study by Babcicky and Seebauer (2017) in Austria explained this fact using the hypothesis of the 'two faces of social capital.' This refers to a situation where recipients of help continue to expect help without putting measures to protect themselves and worse still, do not help others (breaking reciprocity that should sustain a network), leading to broken social networks.

Results on the influence of past flood damage experience from all three cases which we studied are in stuck contrast with Bubeck et al.'s (2013) and Seebauer and Babcicky's (2020) findings of a positive relationship with structural measures. Those who suffered damage perceived lower SE for structural measures. In these communities, it shows that instead of suffering flood-related damage motivating households to protect themselves from similar events in the future, it actually incapacitates them. Additionally, they feel that low-cost measures such as piling sandbags and planting grass are ineffective. In other words, such measures do not offer protection as they would require, especially where flood severity is high. Regarding willingness to mitigate/risk avoidance, our results from all the three cases confirm previous findings in the literature that willingness to mitigate/risk avoidance positively correlates with perceptions of SE and RE for both structural and non-structural measures, but those from Ntinda contradict it. Looking for flood-related information negatively associates with the same, and having implemented costly flood mitigation measures positively relates with SE and RE for both structural and non-structural measures, but negatively correlates with IC sandbags in Natete.

7.7 Conclusions and Recommendations

Our study sought to establish motivating factors for measure-specific coping appraisal in a Sub-Saharan African context comparing slum and non-slum contexts. By and large, the factors influencing flood coping appraisals as postulated in the PMT do apply in all three case study areas. However, we established some context-specific differences from what has been observed in the developed world contexts as reported by the very little existing literature on this topic and level of detail.

First, income negatively influences perceptions of SE for lower-cost structural measures because, in informal economies, those with lower incomes tend to do manual jobs themselves. Second, our findings from the affluent neighborhood confirm what past studies report—that higher education is associated with lower perceptions of SE for structural measures by contrast with what was found in the slum areas. Here too, we expect that income is playing a role since it is correlated with education level. Third, social capital does not necessarily lead to perceptions of lower costs of implementing non-structural measures, which may signal weak social networks (Babcicky & Seebauer, 2017). Fourth, instead of past flood damage motivating households to do more to protect themselves in the future, we see evidence that such events incapacitate them and undermine their sense of resilience. This suggests that low severity but high-frequency floods, such as those in Kampala, can have significant impacts on the resilience of affected communities which should not be underestimated in flood risk reduction strategies and programs.

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